A CRITICAL EVALUATION OF MODULARITY

by

Lieutenant Colonel Michael E. Linick
United States Army

Colonel Henry St. Pierre
Project Adviser

This SRP is submitted in partial fulfillment of the requirements of the Master of Strategic Studies Degree. The U.S. Army War College is accredited by the Commission on Higher Education of the Middle States Association of Colleges and Schools, 3624 Market Street, Philadelphia, PA 19104, (215) 662-5606. The Commission on Higher Education is an institutional accrediting agency recognized by the U.S. Secretary of Education and the Council for Higher Education Accreditation.

The views expressed in this student academic research paper are those of the author and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

U.S. Army War College
CARLISLE BARRACKS, PENNSYLVANIA 17013

Report Documentation Page

1. REPORT DATE **15 MAR 2006**	2. REPORT TYPE	3. DATES COVERED **00-00-2005 to 00-00-2006**
4. TITLE AND SUBTITLE **Critical Evaluation of Modularity**		5a. CONTRACT NUMBER
		5b. GRANT NUMBER
		5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) **Michael Linick**		5d. PROJECT NUMBER
		5e. TASK NUMBER
		5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **U.S. Army War College,Carlisle Barracks,Carlisle,PA,17013-5050**		8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
See attached.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES **22**	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**			

ABSTRACT

AUTHOR: Lieutenant Colonel Michael E. Linick

TITLE: A Critical Evaluation of Modularity

FORMAT: Strategy Research Project

DATE: 8 March 2006   WORD COUNT: 6777   PAGES: 21

KEY TERMS: ARFORGEN, Modular Force

CLASSIFICATION: Unclassified

Modularity is a critical component of the Army's Transformation. This project provides a critical evaluation of it through the perspective of warfighters, planners, and force managers. The evaluation uses these communities to help look at: whether Modularity as a concept is new; at what level we are modularizing; at what is the driving force behind the decision to move to a brigade centric force; and, whether the new force can be sustained as a modular force. The relationship of Modularity to the ARFORGEN model is also examined. The analysis suggests that retaining the essential character of the Modular force will be most taxing for the force managers, and will require – and perhaps enable – a level of fiscal and acquisition discipline in how the force is funded and fielded.

A CRITICAL EVALUATION OF MODULARITY

On 10 January 1995 the U.S. Army's Training and Doctrine Command (TRADOC) published TRADOC PAM 525-68, Concept for Modularity. At the time TRADOC argued that the security environment of the (then) envisioned future was one that would require the Army to "deal with force strength constraints, limits on available forces, dollar constraints, and limits on strategic lift required to transport the necessary capability into theater."[1] Based on this perceived set of force requirements and constraints, the Army developed a concept of modularity that would "permit detaching functions and capabilities from a parent unit and tailoring such functions and capabilities for deployment within a force projection force." This force would also "provide the CINCs with a force that is interchangeable, expandable and tailorable to meet changing missions and needs."[2]

In a similar vein The Army Strategic Planning Guidance, 2006-2023 (ASPG) repeatedly uses the term "modular" and describes it as a core aspect of the restructure of today's United States Army. The ASPG suggests that "Modular, capabilities-based forces will better support Combatant Commander requirements by more effectively enabling the delivery of the right Army capabilities at the right place and time."[3] And, the 2005 Army Modernization Plan highlights modular forces as a "bold and comprehensive initiative [that] is intended to provide Army units that are more relevant to the combatant commanders in today's environment and possess greater versatility in fulfilling the demands of frequent deployments, a wide range of missions, and true joint interdependency."[4]

It would seem, upon casual observation, that TRADOC's vision first described in 1995 has not changed significantly in the intervening 10 years. It would seem that the Army is continuing down a path that was prescient for its time and one that has had a decade to mature. It would seem that the Army understands the concept of modularity, and of modular forces, and is well on its way to organizing itself along well defined lines. It would also seem -- to the more irreverent -- that if we are still, 10 years later, talking about modular forces as a new and bold initiative that perhaps something is wrong.

So, how is it that after 10 years we are still talking about implementing a modular army? What, if anything, has changed? What has remained constant? What has been done? What remains to be done? These are all relevant questions to today's Army and to several major sub-communities of that army. In exploring the answers to these questions it is important to look at those answers through the lens of three different sets of actors; the users, the planners, and the force developers or sustainers. Each of these communities focus on modularity through

a different lens, with different metrics of success and with different challenges. It will also be useful to keep in mind four salient questions to be asked about modularity. The first of these is, at what level is it that we are establishing the modules? The second is, why are we doing this – what is the driving force? The third question is, is this anything new? And finally, and perhaps most importantly, can we sustain this over time?

The first section of this analysis, then, will provide some background on the history of modularity and will focus on framing these last four questions in general terms. The next sections will explore the answers to these questions, and the implications of those answers, in light of the differing perspectives of each of the Army communities mentioned above. Finally, some synthesis will follow that will attempt to look at modularity and answer the questions of what is yet to be done – and whether it should be.

<u>Origins of Modularity</u>

Conceptually, it is difficult to conceive of a time when the army wasn't based on modular principles. In every design of a U.S. Army there has always been a basic "tactical" building block. From the time of the Continental Army until at least the Civil War, the basic building blocks were the Infantry Regiment, the Cavalry Regiment, and the Artillery Battery. All other supporting arms could come in any shape or size. Sub-elements of the Regiment/Battery (Companies, Troops, and Sections) existed, and even the occasional Battalion might be formed.[5]

In the Civil War it was common to "brigade" regiments, but there was no standard in either the US Army or in the Confederate Army for how many regiments constituted a brigade. Similarly, Divisions were merely a headquarters to which more than one brigade (itself consisting of more than one regiment) could be attached. Both armies experimented with various artillery organizations, but all were based on the Battery, usually 4 guns in the Confederate Army and 6 in the Union. What differed within the artillery were the views with regard to centralization or decentralization of the larger artillery formations.

What began to distinguish armies of later wars, particularly WWI and after, from the Civil War era was the assignment within the brigade and within the division of more than one arm of service. Divisions became less flexible in design to some extent -- e.g. the "square" four brigade design of WWI Infantry divisions, and the "triangle" divisions of WWII – and yet more flexible in design at the same time, as they began to include organic signal, artillery, engineer, logistic, and other supporting troops.

The basic concept behind these designs was simple -- a Headquarters had a certain span of control, generally expressed in terms of the number of maneuver brigades for which it could provide command, control, and support. The division also had a certain availability of, increasingly standardized, organic assets with which it could reinforce the efforts of subordinate units. In turn, higher echelons (Corps and Armies) had additional assets, each type individually designed in a common fashion and based on function, with which it could provide assistance to subordinate Corps or Divisions. In essence, to use modern parlance, EAD and EAC enablers provided "plug-and-play" capabilities to subordinate formations. Formations with similar functional tasks were designed with similar functional designs and what varied most over time was the level of integration or homogeneity internal to the Brigade (and later to the Battalion). In some designs (e.g. the Brigades and Battalions of 1995) the basic brigade was incapable of independent action without significant augmentation from division assets.   The reality was that for a Brigade to fight, it had to be first organized into a Brigade Combat Team and augmented with artillery, logistics, and other support from the Division. By contrast, the Brigades of the late 1970s (the H-Series TOEs) were relatively self-contained entities, including organic Air Defense, Military Intelligence, Support and Transportation assets. In a sense, then, modularity, as a concept is not new. It was not, however, described in terms of "modularity" until recently.

As discussed earlier, modularity was the basis of a TRADOC PAM as early as 1995. In that publication, TRADOC was careful to define modularity as "a force design methodology which establishes a means of providing force elements that are interchangeable, expandable, and tailorable to meet the changing needs of the Army."[6] TRADOC also emphasized that the focus of the concept was at echelons above division (EAD).[7] Finally, TRADOC described several different methodologies for organizing modular units, including; Functionally Emulative Increments, Modular Designed Elements, Nested Modules, Functional Modules, and Forward Modules.[8] In other words, although the idea was to create a system of "interchangeable" parts that could be assembled based on organic capabilities and thereby provide a "tailored" force package, it was recognized that the "capabilities" to be modularized were primarily the combat support and combat service support activities that occurred at EAD levels. It was further recognized that this could be done in many different ways, mostly differing in whether a unit would contain a variety of small capabilities and deploy as a unit, or whether is would contain a single set of capabilities and deploy individual detachments each capable of delivering a small quantity of that capability to a supported unit.

Based on this kind of thinking, a whole host of studies and analysis were conducted, attempting to apply modular principles to all types of tactical organizations. Monographs of the

period abound that describe how the principles of modularity enunciated in TRADOC PAM 525-68 have been or should be encapsulated in the design of what was then called the "Force XXI Army."[9] What characterizes these monographs is their attempt to show how supporting units can best be modularly tailored to provide support to combat units – brigades and divisions.

Today, by contrast, the centerpiece of modularity occurs at a level below division but is still all encompassing in many ways. The tactical basis of the US Army will shift from a division centric force to a Brigade Combat Team (BCT) centric force. The new BCTs, which were originally referred to as Units of Action (UAs), will be more "self contained, sustainable and capable" according to the 2005 Army Modernization Plan.[10] According to the Operational Concept for Maneuver Units of Action, the UA will be the "smallest combined arms units that can be committed independently."[11] Thus, the main thrust of modularity has shifted from Echelons Above Corps, to echelons below division, from Combat and Combat Support to Combat Arms, and from small units and teams to organizations as large as a Brigade Combat Team.

Of course, combat BCTs, also known as modular BCTs, will not be the only part of the force being modularized nor will there only be one type. Three major designs of combat BCTs will be present in the force mix; Heavy, Infantry, and Stryker. There will also be Combat Aviation, Fires, Battlefield Surveillance, Combat Support (Maneuver Enhancement) and Sustainment Brigades. Other organizations falling within the purview of "modularity" include Headquarters above the combat BCT level. These modernized and modular headquarters come in three varieties, one capable of replicating many of the roles of today's Army Service Component Commands and Field Armies, and others providing three-Star Corps and two-Star Division level HQs capable of functioning as a Joint Force Land Component Command Headquarters or as a Joint Task Force headquarters respectively. [12] Other supporting branches are using support to the modular brigades as their design 'forcing function' and are in term claiming the mantle of modularity with respect to their redesign . . . and the costs associated with it.[13]

Comparison of the two concepts of modularity is intriguing. In 1995 modularity was designed to make units interchangeable and tailorable, today it is to make them self-contained and sustainable. In 1995 modularity was based on a need to enhance "the Army's ability to rapidly respond to a wide range of global contingencies with a force possessing needed functions and capabilities, while deploying a minimum of troops and equipment."[14] While in 2005 modularity is based on the need to "provide combatant commanders with lethal, agile and versatile forces -- with boots on the ground, ready-to-fight-on-arrival characteristics and

4

endurance for sustained land combat."[15] Further, today, it is almost impossible to talk about Army modularity without talking about Army Force Generation…the need to maintain a sustainable long-term rotation of forces in Iraq and Afghanistan. A Congressional Research Service report notes that, with regard to modularity,

> while the Army cites the need for a more responsive, deployable, joint, and expeditionary force, others suggest that the primary reason for redesign is the ever increasing long term troop requirements to support the Global War on Terrorism (GWOT). The addition of up to 15 additional active duty and a yet to be finalized number of Army National Guard brigade-size UAs could provide an additional force pool of deployable units to ease the burden on units presently deployed and possibly to shorten the length of time that units are deployed on operations.[16]

It is this need for a sustainable rotation policy -- a force generation model -- which can be seen as one primary driver behind modularity. But that perception may be too simplistic. Certainly there has been much written and discussed in recent years about the best ways in which to reorganize the army.   A much celebrated work, "Breaking the Phalanx", by Douglas Macgregor was first published in 1997. Macgregor argued forcefully for the need for the army to reorganize along the lines of Brigade Combat Teams. His thesis was that "Trained and organized for a style of war that has changed very little since World War II, current Army organizational structures will limit the control and exploitation of superior military technology and human potential in future operations."[17] Macregor's recommended solution was development of a more agile, smaller, mobile, integrated, all arms combat formation.[18] Macregor's subsequent criticisms of Army Modularity have less to do with the basic concept of the modular BCT, and more to do with the actual design chosen.[19]

The Chief of Staff, Army puts modularity in terms of a monetary allusion. Divisions represent $100 bills in an era where making change is difficult and where most costs incurred are in the $20 price range. "So if we have a $60 fight, we can put three $20 bills together, but if we have an $18 or $20 fight, we have a unit that's capable of a better integration (with other forces) and a higher level of operation."[20]

Reviewing the answers to the questions that led into this section will provide an effective introduction into the next areas of discussion. Asked was, at what level is it that we are establishing the modules? What is the driving force behind modularity? Is modularity anything new? And can it be sustained? To recap the answers, today's envisioned modular force is focused at the Brigade Combat Team level and at the Headquarters level. There is some debate about the driving force, with many arguing that it is driven by a force generation/rotation methodology and others that it is merely a fundamental redesign of our tactical and operational

formations, upon which, perhaps, the ARFORGEN was based. Is it new…not necessarily. Modular forces themselves are not new, but this particular design, a brigade centric one, may be. As to whether it can be sustained, that discussion will follow, as we look through the lens of three different communities.

<u>Modularity and the "User" Community.</u>

The "users" of modularity may seem a strange turn of phrase. It is intended to capture the war fighter's perspective on the new modular formations, as distinct from the perspective of the other communities to be examined. A warfighter – a user -- either receives the modular Brigades to command and control or exists within one of them. This implies a distinctly different set of evaluation parameters than those that might be relevant to a planner or to a force designer.

The Congressional Research Report (CRS) on Modularity suggests that the Army expects to gain improvements in three key capabilities by utilizing the modular force design[21]. The first is in the area of deployability. TRADOC describes this as a force that "facilitate[s] force packaging and rapid deployment."[22] The CRS discussion of this capability area focuses on lift requirements. From this perspective, it is difficult to assess the validity of the Army's claim. From the strict perspective of numbers of vehicles and people moved, the CRS almost seems to imply that the modular design is more about getting something called a "brigade" somewhere in a set amount of time, and the lift that that will require, than it is about what that brigade is capable of doing upon its arrival.

From a soldier's point of view, however, the integrated design of the basic UA is a clear aid to deployability. In deploying a current force Brigade, as was mentioned above, the first thing that has to occur is to form the Brigade Combat Team. Attaching, detaching, "marrying up units" and integrating them are all distracters from, and contribute to the lengthening of, a deployment process. Given that, at least at the Brigade level, the UA will be mostly self contained, it should greatly ease the coordination tasks of deployment. What is not so clear is whether the same efficiencies in deployment can be achieved at levels above the modular BCT.

Supporting brigades -- fires, aviation, support, etc – will not necessarily be deployed *in toto*. Rather, they will be force packaged to provide the "tailored" support necessary for the specific design of the deploying combat force mix. Again, this is nothing new. But because it is not new, in the same sense as the "self-contained" BCT, it is hard to ascribe to it any efficiencies in deployment. The Army's perspective seems to be that based on the modular

design it will be able to deploy a smaller, more tailored, and therefore less lift-demanding force to achieve the same level of effort or capability.

The second area in which CRS claims that the Army expects to gain improvements is in the area of lethality. In this area it is hard, at times, to distinguish between increases in lethality that can be attributed to unit design and those that can be attributed to unit equipment. Modularity is occurring hand-in-hand with modernization. CRS quotes LTG Curran, Director, TRADOC Future Center as suggesting that the increase in lethality will be due to increased reconnaissance capabilities and better linkages to joint fires. Are these reconnaissance capabilities those found in the new Unmanned Aerial Vehicles and ground sensors in the Future Combat System program? Are they merely the result of process and technical changes that lead to better communication between existing and future sensor systems? Or, are they directly attributable to the fact that more reconnaissance capability is under the direct command and control of the Brigade level commander in a Modular force than was available under the division-centric force? Further, does the enhanced lethality of the BCT come at the expense of a decrease in lethality from what would traditionally be called "deep fires" – those fires normally associated with the Division or Corps and not with the maneuver brigades? Is this just a lethality "shell game"? Clearly all the different elements of the Army's DOTML-PF process are at play in modularity. It may not be possible or necessary to extract which percentage of change can be attributable to which change in DOTML-PF.

But, Michael Vickers, from the Center for Strategic and Budgetary Assessments, addresses this lethality issue somewhat differently. From his perspective it is 'strategic speed' that the Army is attempting to improve by modularity and transformation. To Vickers,

> Strategic speed is not a significant weakness for the army. If the first portion of Operation Iraqi Freedom had taken four days as opposed to nineteen days, the U.S. Army would still be at the 99th percentile in terms of its ability to remove a medium regime in conventional war. Strategic Speed is also largely irrelevant in irregular warfare. Speed does kill, but it is operational speed; it is not how fast U.S. forces got to Iraq, but rather, how fast they moved once there.[23]

In line with Vickers' comments about irregular warfare, one additional set of criticisms has been leveled with regard to Army claims for increased lethality. CRS notes "While the UA's lethality may be relevant in combat operations against enemy armored and infantry formations, some believe that this type of lethality is not a major consideration in stability and security operations, and in the conduct of a counterinsurgency campaign – the type of campaigns being waged in Iraq and Afghanistan."[24] In a similar vein, Brian G. Watson argues that "the Army's major transformation effort – the Modular Force – does little to improve the Army's stabilization

capability", a capability that he further argues is the "major capability gap in today's force – and vital for future campaigns."[25] And Douglas Macgregor's theme, in his comments to Congress regarding Army Modularity, was that the lethality encompassed within the modular brigades was insufficient to the needs of the war in Iraq – a function of a too small brigade design. He also argues that the modernization initiatives within the Army, specifically the enhancements to be gained by increased recon are "an illusion" and un-fundable across the total force.[26]

It is, perhaps, too early to tell how well founded these criticisms may be. The very concept of modularity implies that you continue to 'add' modules until the force is sufficient to the mission it is given. Thus, if the criticism of modular brigades is that they do not have enough "boots on the ground" to do stabilization missions or irregular warfare, then, it would seem the answer is to add more modular brigades until the necessary amount of boots are present. If, on the other hand, the argument is that the brigades themselves do not have the ability to accomplish the tasks, then it is the internal design that must be re-examined. Time will tell whether a modular Combined Arms Battalion can, in fact, produce the types of presence necessary for these types of missions.   And, the Army has a well practiced process for conducting such an evaluation and adjusting the Table of Organization and Equipment (TOE) as needed. What is salient, again, about the criticisms offered is that none seem to recommend a return to a Division centric force. It is the design chosen and not the design concept that is at the heart of these debates.

Finally, the CRS notes that the Army expects, as a result of modularity, to achieve increases in "Jointness". Again, with regard to the modular brigades themselves, it is difficult to separate design from equipment. However in achieving the goal of Jointness the redesign of the brigade headquarters and of the two and three-star level headquarters takes a central role in the modularity process. In current-force brigade, division and corps headquarters it has been long assumed that augmentation could provide the ability for the HQ to function both within the Joint community and as a Joint HQ. But augmentation was in the form of ad hoc 'add-ons' to the force. The new modular HQ designs will be designed to be "Joint Capable" both in their manning and in their equipping. This is a change in design philosophy that more closely represents the recent historical record of Army operations and the Army's desire to be more joint capable and expeditionary. [27]

Modularity and the "Planner" Community

It was noted earlier how Modularity has been linked to the Army Force Generation Model. From a planner's perspective this would seem to be the crucial aspect of modularity. In this

case the planners are not the campaign planners of a corps or division staff but, rather, the force planners who produce such documents as the Contingency Planning Guidance (CPG) or the Global Force Management documents. Understanding what forces will be available, when, at what state of readiness, and with what capabilities is key to these processes. Modularity, tied to the ARFORGEN, provides these planners with the same basic planning structure as does the USAF's Air Expeditionary Force concept, the USN's Carrier Battle Group rotation plan, or the USMC's rotation of Marine Expeditionary Units.

ARFORGEN's purpose has been described as to, "Provide Combatant Commanders and Civil Authorities with **steady state supply** of modular, trained, ready, cohesive and rapidly deployable Army forces with capabilities to meet requirements for continuous full-spectrum operations." (emphasis in original)[28] Similarly, ARFORGEN's bottom line has been described as "provide(ing) a rotational base to maintain an Available Force Pool with 20 BCTs (14 AC / 6 RC) to meet strategic requirements for persistent conflict." Included is the ability to use 10 BCTs on 6 month deployments for meeting Baseline Security Posture requirements, or to use the full 20 BCTs on 12 month deployments to deal with larger commitments. Additionally, the capability exists to surge an additional 20 BCTs from the Ready Force Pool to meet additional strategic requirements.[29]

To return to the CSA's money analogy used earlier, the ARFORGEN is based on the projected need for, and availability of, $20 dollar bills. It allows for a more nuanced approach to providing forces to the combatant commanders and to providing planning information to the planning community than would have been available in a world of only $100 bills.

But, there are at least two critical assumptions built into the ARFORGEN model that are significant with regard to the use of modular forces.   The first assumption is that each year's worth of forces available within the ARFORGEN cycle will have roughly the same set of capabilities resident within it as those of the year that preceded it and the year that will follow. The second is that the force mix available within each year's cycle will be appropriate and capable for the missions demanded of it. Put differently, there must be consistency from year to year in the missions planners expect to have to be ready to execute and the forces planners expect to have available, and there must be an expectation that those available forces have the capability to meet those expected requirements.

It can be argued that neither of these assumptions is tied directly to modularity -- that today's division centric force could be managed within the ARFORGEN just as easily as could a modular one. Perhaps this is true; however, it is important to understanding modularity that the nuances of these two assumptions be examined. The internal design of the modular brigades –

the subject of much of the criticism discussed above – is driven to no small extent by the demands of the ARFORGEN cycle and by the force size restrictions of the Army. The Navy may have a clear and compelling logic for the need for 10 carrier battle groups (CBGs); logic that includes the strategic demands for presence, the operational demands for forces in major combat operations, and the institutional demands for training and for re-fitting of crews and ships. But that logic does not dictate, necessarily, the composition of the group itself, except of course for the need for an actual aircraft carrier and its associated air wing. Nor has the logic of the 10 CBGs prevented the Navy from its own 'modular' experiment of essentially splitting the CBG into both a carrier strike group (CSG) and an expeditionary strike group (ESG). From an Army perspective the clear and compelling logic of the ARFORGEN is built around similar demands; presence, combat and stability operations, and re-fit of forces. All of this is built around a three year cycle (six years for the reserve components) which is believed to be sustainable from a personnel tempo perspective. What is missing is the kind of clarity on the essential core capability of each BCT or ARFORGEN cycle that is provided to the Navy by the logic of the carrier itself and of its air wing.

The requirement within each year of the three year cycle to have forces capable of meeting the operational needs – both the steady state needs of ongoing stability and presence operations, and the potential needs for surging to respond to a regional crisis leading to a major combat operation – drive the need for forces with a definable set of capabilities. The Army's perspective is that those capability requirements can better be met by a force of ten or twelve $20 dollar bills than they can by a force of two $100 bills (to again borrow from the CSA's analogy). Certainly any force planner can appreciate the flexibility inherent in having this larger number of lesser capabilities to mix and match.

However, the CSA's analogy can be somewhat strained by the force planning process. All $20 bills are alike. All modular brigades are not. The Army envisions four types of modular brigades in the future. The current set of Infantry, Stryker, and Heavy will be complemented in the future with Future Combat System equipped Heavy BCTs. The modular force must ensure that each ARFORGEN cycle provides the necessary force mix to allow for the capabilities to be "spent" in accordance with their own unique abilities and to provide the planners the consistency of forces from cycle to cycle.

Additionally, it may turn out that crises and missions tend to come in the $25 (or even $15) range of requirements and not the $20. In other words, the design of the brigade may need to be re-examined from a capabilities and size standpoint in order to maintain the necessary flexibility within the system.

A quick look at one ARFORGEN projection shows that it may not, yet, provide that necessary consistency in forces or capabilities available. Figure 1 is taken from a HQDA briefing on ARFORGEN.[30]

UNITS	FY10 Force Mix	RESET / TRAIN FORCE POOL	READY FORCE POOL	AVAILABLE FORCE POOL
Operational HQs	21			
AC BCTs	HVY 19 SBCT 6 INF 18 43	HVY 5 SBCT 2 INF 4 11	HVY 8 SBCT 2 INF 8 18	HVY 6 SBCT 2 INF 6 14
				←32 deployable→
RC BCTs	HVY 10 SBCT 1 INF 23 34	HVY 5 SBCT 1 INF 11 17	HVY 3 SBCT 0 INF 8 11	HVY 2 SBCT 0 INF 4 6
				←17 deployable→

FIGURE 1

Although this was briefed as only an example possible future, it is nevertheless clear to see that there can, and probably will, be significant variance in both the force size and force structure available in any one year's cycle. The example noted, with 32 AC and 17 RC BCTs available, represents the largest force of the three possible combinations implied by this chart. If the chart represents the year 2010, then in 2012 the AC will only have 25 AC to complement the 23 RC BCTs available. If one looks at Heavy BCTs, then the 2010 numbers are 19 (14 AC and 5 RC) while the 2012 numbers are 18 (11 AC and 7 RC), reflecting some what more consistency, but implying a larger difference in Infantry BCTs or SBCTs available. It is uncertain whether this level of variance in both the numbers and types of modular brigades available each year will provide the planners with the consistency that they would hope to have.

There is even considerable inconsistency in how many modular BCTs will be available. The briefing from which Figure 1 was drawn assumes 77 for purposes of the chart, 43 of which are Active Component, but notes elsewhere that it may be as high as 82.[31] Meanwhile, a Congressional Research Service report lists the number of Modular BCTs as having started at 48, dropping through 43 and 42 to 39 and projected to drop further to 36. Similar cuts are expected in the RC BCTs.[32]

Thus, as of yet, ARFORGEN has not produced the consistency a planning community would hope for. However, as noted earlier, Modularity itself is not directly tied to the ARFORGEN…we could still be generating divisions instead of BCTs. Modularity is an effective enabler of ARFORGEN by providing it a more fungible force with which to work. The

inconsistency in the numbers and capabilities of the modular force are challenges to be examined in the next part of the analysis.

Modularity and the "Force Management" Community

The Force Management community has, perhaps, the greatest challenge with regard to modularity of any of the communities examined so far. The first of these significant challenges is in how to pay for the modular force, the second is in how to sustain its essential nature. The trade literature is literally rife with discussion about how the Army can manage to pay for on-going operations, transformation and modularity all simultaneously. More specifically, as the Army is forced to wean itself from the use of budget supplementals, the difficulty will be in how to fund modularity in a relatively flat Army top-line budget.

In February, 2005, it was reported that Modularity would cost the Army $5 billion annually through 2011 for equipment alone. This did not include additional personnel costs, stationing costs, or costs associated with merely re-fitting existing equipment within the modular brigades as that equipment returned from war. Collectively, this total transformation bill was expected to total $12 billion per year.[33] But, it turns out, this money was merely "additional" money needed, and not the total costs expected to be incurred. The Congressional Research Service, in February 2006, estimated the costs as having risen from $20 billion per year in January 2004(FY 2004 – 2011) to $28 billion in July 2004, to $48 billion in March 2005 for FY 2005-2011.[34] The GAO reports that the Army plans to rely on at least $10 billion of this to come from the FY 2006 supplemental budget, with the remaining portion ($38B) coming through normal appropriations. But, the GAO also reports that the $48B cost is probably an understatement that does not include any potential additional manpower costs, uses an equipping plan that provides for less equipment than called for in the basic modular BCT designs, and is also dependant on a series of basing and construction decisions that have not yet been fully ratified by Congress.[35]

The challenge is linked to the discussion earlier about the uncertainty with regard to how many BCTs will be in the force. If one of the driving forces behind modularity is to have each year's ARFORGEN cycle populated with enough forces to be effective then the Army can trade either the number of forces or the quality of forces in order to meet budget imperatives. In other words, it can either choose to produce fewer $20 bills in each cycle (a variance in the number of BCTs) or it can choose, instead, to produce $18 dollar bills (a variance in cost and capability). What is unclear is whether it can, under either set of choices, continue to provide $200 worth of capability in each cycle – the capability demanded by the strategic requirements of the planned for future.

12

These difficult decisions are not new. The Army is trading its old system of "tiered readiness" for a new one of "cyclical readiness". From a Force Planners perspective this means replacing the old Department of the Army Master Priority List (DAMPL) process with a new process. Under DAMPL, high priority units got new equipment first and older equipment cascaded down to lesser priority units. The same was generally true for other resources, including training dollars and personnel. When equipment was delayed, or dollars were cut, units at the "bottom" were affected significantly more than units at the top. Over time, significant variance could be found in the modernization and readiness levels of top-tier units and bottom tier ones (especially those in the RC).

With cyclical readiness, the challenge will be two fold. First, once every three years, every unit in the Army will be the top priority. Second, the training cycle and the realities of deployment provide distinctly different imperatives for when to modernize the force.

Given that the every unit will cycle through being "the first to fight", every unit has a reasonable expectation that it will be fully modernized before it goes. But, historically, the Army has never been able to 'buy out' a program line in three years, let alone six. Thus, as a group of units enters its three year cycle, the army will only have resources to modernize a fraction of them. As the cycles continue year after year, the army will fall further behind…as measured against the presumably desirable goal of having all BCTs roughly equal in capability.

The Army could, of course, adopt a nine-year-buy type philosophy (or a 12-year one if necessary), whereby within each of the three force pools articulated by the ARFORGEN model one-third is "the most modern", one-third is in the middle, and the remaining third is the least modern. Presumably each individual BCT would rotate through these three states, with the least modernized BCT having first claim on new equipment as it enters the next full turn through the cycle and the previously most modernized brigade now becoming part of the 'middle' tier.

To preclude a variance in modernization that will, over time, all but make a mockery of the concept of modular design, the Army must come to grips with, and discipline itself with regard to, how it will manage its procurement and fielding. In truth, this may be a boon to the Army, in that they can tie budget requests and annual procurement objectives to an agreed upon model. It has long been a complaint on the Army staff that it is easier to quantify the costs of an Air Wing or a CSG than it is Army forces – and harder to decrement those other service's costs than it is to cut a few tanks here or artillery pieces there. The force managers may be able to use this combination of the ARFORGEN and modularity to make a more logical set of demands on the Army's budget and on Congress for funding and acquisition goals each year.

But, the question still remains as to when in a unit's life cycle will it be modernized and with what. The standard ARFORGEN cycle begins with a year of "refit/train", before entering a year of "ready" status, and then graduating to "available status". In each of these cycles there are different imperatives for what equipment, and for what types of equipment, will be fielded to the force.[36]

During reset/refit major end items should be fielded, especially if they represent significant changes from current equipping (e.g. moving from one type aircraft to another, or from M1/M2 to FCS). Other available equipment should also be fielded. These represent the changes with the greatest training or organizational change implications. However, as units become "ready" and "available" additional equipping may, and probably will, become necessary.

One reality discovered (or perhaps re-discovered) during the current operations in Iraq and Afghanistan, is how much we learn about what we really need to fight only when we are actually in a fight. As units deploy, the discover new requirements, whether they be a need to counter IEDs or the fact that support units are fighting in ways not imagined previously and for which they are not resourced. These drive a series of actions, including the delivery, in theater, of material responding to Operational Needs Statements. Lessons learned from this in-theater fielding are used to refine modernization plans for follow-on or non-deploying forces. It would be unconscionable – and therefore, one would hope, unthinkable -- for the Army to wait to outfit non-deployed units until they re-entered a re-fit cycle. These units would receive this new equipment during their own 'ready' or 'available' cycle and prior to their deployment.

In general, this type of modernization should have a smaller impact on training and organization than would the activities of a major re-fit, re-equip, re-organize cycle. Nevertheless it will have an impact. Further, it will cause additional 'variance from the norm' as deploying units receive equipment that is not made available to non-deploying units within each cycle. The obvious answer is to have the fiscal and managerial discipline to essentially re-baseline the BCTs as they enter the re-fit cycle – to essentially allow the units that did not receive the equipment to 'catch up' at that time. Again, this will become difficult depending on the procurement and budget environment.

Conclusion

This review of modularity began with a series of questions and progressed through a series of critiques or highlighted issues. The facts reveal that modularity is a relatively simple concept. The basic decision to be brigade-centric instead of division-centric breaks no major new ground in the organization of armies. It is a choice, and it is clearly a valid and perhaps

14

even necessary choice for our Army at this time in world affairs. This is true especially as we are able to pack more capability into smaller units, and to leverage our increases in command and control abilities to allow for more dispersed and independent operations. The exact design of the modular brigades is contentious, and will be contentious for years to come. But, the Army systems designed to do DOTML-PF analysis and to drive organizational changes based on the logic derived from that analysis are sound. If the first BCTs 'aren't quite right' the next ones will be better, and they in-turn will also improve.

But, the simple can also be complex. Modularity is merely one component of the overall Army efforts at Transformation. As such, it will be pulled into the eddies of decisions and processes that surround it. The financing and fielding of Future Combat Systems, management of the intricacies of the ARFORGEN model across time and across components, not to mention responding to changes in the strategic environment and the demands that that will place on our units and our structure, will all have secondary impacts on the modular force. What will be needed is a sense of discipline in funding, acquisition, fielding, and training that ensures that our "modules" remain relatively alike in form and function. An Army of four essential types of modular BCT cannot be allowed to change into an Army of 44 radically different brigade sized combat formations. . .not to mention the myriad of support BCTs, all subject to the same considerations discussed above. Combat leaders will learn to adapt to how to fight in a modular world. The Army, as an institution, must make sure that those leaders don't have to learn 44 different ways to do it.

Endnotes

[1] U.S. Department of the Army, *Military Operations, Concept for Modularity,* TRADOC Pamphlet 525-68 (Fort Monroe, VA, 10 January 1995), 1, available from http://www.tradoc.army.mil/tpubs/pams/p525-68.doc accessed 25 Dec 2005.

[2] Ibid. p. 3.

[3] U.S. Department of the Army, *The Army Strategic Planning Guidance 2006-2023*, (Washington DC: U.S Department of the Army, undated), 7.

[4] U.S. Department of the Army*, 2005 Army Modernization Plan*, (Washington DC: U.S. Department of the Army, February 2005) 25.

[5] There are several sources of material available regarding historical design and organization of the U.S. Army. Of particular use in this section is: John J. McGrath, *The Brigade: A History; Its Organization and Employment in the US Army* (Combat Studies Institute Press, Fort Leavenworth, KS, 2004)

[6] TRADOC PAM 525-68, 5.

[7] Ibid.

[8] Ibid., 5-7.

[9] See for example, William E. David, *Modularity: A Force Design Methodology for the Force XXI Divisional Military Intelligence Battalion* (Army Command and General Staff College School of Advanced Military Studies, Fort Leavenworth, KS, 1995) or William M. Landrum, III, *Building Combat Power: The Army's Modern Land Force Finance* (U.S. Army War College, Carlisle Barracks PA, 1996)

[10] *Army Modernization Plan*, 5.

[11] U.S. Department of the Army, *The United States Army Objective Force Operational Concept for Maneuver Units of Action,* TRADOC Pamphlet 525-3-90 (Ft. Monroe, VA, July 2002), 2.

[12] *"Modular Forces",* Leadership of the Future Website, TRADOC , available from http://www.tradoc.army.mil/pao/Web_specials/Leadership_of_Futures/modforce.htm , accessed 28 February, 2006.

[13] See for example the redesign of the medical forces as discussed in, Angel L. Lugo, James P. Normile III, Edgar B. Murphy and Larry W. Wild, *The Army's MRI*, Military Medical Technology Online Edition, Vol 10, Issue 1, 27 Jan 2006, available from http://www.military-medical-technology.com/article.cfm?DocID=481 , accessed 28 Feb 2006.

[14] TRADOC Pamphlet 525-68,1.

[15] TRADOC Website, *Modular Forces*

[16] Andrew Feickert, *U.S. Army's Modular Redesign: Issues for Congress, CRS Report for Congress, Congressional Research Service* (The Library of Congress, Washington D.C. July 19 2004), i.

[17] Douglas A. Macgregor, *Breaking the Phalanx; A New Design for Landpower in the 21st Century* (Praeger, Westport Connecticut, 1997), 227.

[18] Ibid., 53.

[19] See, for example, Macgregor's briefing to Congress, *"Transformation and the Illusion of Change: Where is the Army really headed? What is to be done?",* Presentation to the House Armed Services Committee, 21 April 2005, available from http://www.thedonovan.com/archives/historystuff/IllusionOfChange(Macgregor)%20(2).pdf#search='Transformation%20and%20the%20illusion%20of%20change%2C%20congress' accessed 28 February 2006.

[20] Peter J. Schoomaker, in Cynthia Bauer, Top *Soldier Talks Army Transformation*, Air Mobility Command Public Affairs, 5 Nov 2003 available from http://public.amc.af.mil/news/2003/November/031107.htm , accessed 28 Feb 2006.

[21] See Feickert,14-16, for all of the CRS discussion throughout this section.

[22] TRADOC Website, *Modular Forces.*

[23] Michael Vickers in, Vance Serchuk, Lauren O'Leary and Elena Alberti, *Summary*, American Enterprise Institute Conference on The Future of the United States Army, Washington D.C. 11 April 2005, available from http://www.aei.org/events/filter.all,eventID.1011/summary.asp accessed, 28 Feb 2006.

[24] Feickert,16.

[25] Brian G. Watson, *"Reshaping the Expeditionary Army to Win Decisively: The Case for Greater Stabilization Capacity in the Modular Force"* (Carlisle Papers in Security Strategy, Strategic Studies Institute, U.S. Army War College, Carlisle, PA, August, 2005),1.

[26] Macregor, *Transformation and the Illusion of Change*, see particularly slide 5 and slides 11-14.

[27] John A. Bonin, "Modularity: Designing a Campaign Quality Army with Joint and Expeditionary Capabilities", briefing slides with speakers notes, Carlisle Barracks, U.S. Army War College, 20 December 2005.

[28] "HQDA ARFORGEN 101 Brief, Army Force Generation", briefing slides with speakers notes, 16 Jan 06, slide 10.

[29] Ibid., slide 28.

[30] Ibid., slide 27.

[31] Ibid., slides 27 & 28.

[32] Andrew Feickert, *U.S. Army's Modular Redesign: Issues for Congress Updated February 6, 2006, CRS Report for Congress* (Congressional Research Service, The Library of Congress, 2006) pg. 21.

[33] Amy Klamper, "Army seeks $12 billion annually for transformation", (GOVEXEC.com, 10 February 2005) available from http://www.govexec.com/dailyfed/0205/021005cdam2.htm accessed 28 Feb 2006.

[34] Feickert, 2006,14.

[35] Sharon Pickup and Janet St. Laurent, *Force Structure: Preliminary Observations on Army Plans to Implement and Fund Modular Forces, Testimony Before the Subcommittee on Tactical Air and Land Forces, Committee on Armed Services, House of Representatives* (Government Accountability Office, Washington D.C., 16 March 2005),14.

[36] "HQDA ARFORGEN 101 Brief, Army Force Generation", slide 13.